When Energy Policies Change: The Challenge of Market Integration for New Ventures in the British and German Power Sectors

Abstract

In Britain and Germany, market integration threatens the entrepreneurial nature of energy policy in both countries. This could have substantial implications for the Energy Transition. This paper seeks to understand the perceptions of entrepreneurs of the changes to support mechanisms for renewable energy and how this may impact upon the sustainable transformation of the energy sector in both countries

Keywords

Entrepreneurship, energy, environmental innovation, market integration

1. Introduction

Through its Climate and Energy Package, the European Union has stipulated that all member states must dramatically increase the proportion of their energy consumption that comes from renewable sources whilst improving energy efficiency and reducing carbon emissions (European Commission 2015). Longer-term environmental goals imply a sustainable transformation of the energy sector, with existing structures based on conventional fossil fuel generation being overhauled and replaced by environmentally-superior ones in a process of environmental creative destruction (Hart, Milstein 1999, Schaltegger 2002). Each member state has a choice as to how it implements the expansion of renewable power generation and there has been variability in how this has been approached. A "thousand flowers" strategy, based on grass-roots, citizen-led adoption of renewable energy (Foxon 2011), has characterised Germany's *Energiewende* and Britain has imitated this approach more recently, although citizen energy is not as pronounced as in Germany.

Wüstenhagen, Wuebker (2011) argue that energy policy with an "entrepreneurial flavour" is likely to have greater success in delivering a low-carbon energy sector, citing the poor engagement of incumbent utilities in renewable power. Although this conflicts with other authors, such as Schaltegger (2002) and Hart, Milstein (1999), who highlight the potential of market incumbents to disseminate radical environmental innovation on the mass market, there is substantial justification for the view that entrepreneurs are important to the process of the sustainable transformation of the energy sector.

In the UK and Germany, subsidy mechanisms, in the form of feed-in tariffs have been deployed to create markets for renewable energy technologies – these are long-term fixed payments to renewable power generators in exchange for the power that they feed into the electricity grid. In addition, the UK has operated a quantity-based Renewables Obligation under which generators are obliged to source an increasing proportion of their power generation from renewable sources – they must prove that they have generated the required amount through accumulating sufficient *renewable obligation certificates* (ROCs) which are tradable (ofgem 2015). Should generators fall short of their targets, they can purchase ROCs from other operators and this, therefore, creates an artificial market for renewable power, enabling new ventures (and others) to capture additional value from the renewable power they generate.

These mechanisms have helped entrepreneurs to overcome environmental market failure which hinders the diffusion of radical environmental innovations, as the environmental benefits arising from the innovation are externalities, therefore accrue to society as opposed to the individual, weakening the incentive to adopt (Dean, McMullen 2007). This problem of externalities is compounded by the fact that environmental resources are undervalued in the current economic system (Cohen, Winn 2007) and these mechanisms, altering incentives in favour of green energy, have enabled environmental entrepreneurs involved with renewable energy to escape what Pacheco, Dean et al. (2010) describe as a "green prison" in which radical environmental innovations are at an inherent disadvantage to existing economic structures.

As renewable generation has continued to expand in Britain and Germany, the support mechanisms have, arguably, become a victim of their own success. They are levied from

consumer energy bills and imply a cost for the average consumer – in Germany, especially, there has been ever greater concern about the cost of the support mechanism; Germany has one of the highest electricity prices in the EU (Eurostat 2015). Moreover, there has been opposition in the British press, with increasing criticism of "green levies and taxes" with the Conservative Government even referring to the levies as "green crap" (Carter, Clements 2015). In Germany, the public discourse has featured anxiety over the increasing energy costs as weakening Germany industry's ability to compete on the world market. Moreover, as the proportion of intermittent renewables has passed a certain threshold, the challenge of integration has become more serious. Renewable power is intermittent and the feed-in tariff does not provide an incentive for generators to match supply with demand and, in Germany, has led to disruption on the power market, leading to erratic power prices (Gawel, Purkus 2013).

In response to this challenge involving the integration of renewable power into the wider energy market, the British and German governments have embarked on major reforms to the support mechanisms which involve reduced feed-in tariffs and greater market exposure for renewable generators. This represents a major shift in the institutional environment for new ventures in the British and German energy sectors. Taking a case study approach, this paper will examine (i) the challenges of market integration for new ventures in Britain and Germany and (ii) how these changes affect the entrepreneurial flavour of British and German energy policy and (iii) the implications of these changes for the sustainable transformation of the British and German power sectors.

2. Literature Review

Since new energy technologies are at a cost disadvantage to incumbent technologies, in the formative stage of the evolution of the energy industry, renewable energies operate in protected market niches prior to expanding to the mass-market (Jacobsson, Bergek 2004) This protected market niche has been formed by the support mechanisms for renewable power introduced in EU countries in the framework of the Energy and Climate Package.

2.1. The Effectiveness of Feed-in Tariffs in Stimulating Energy Entrepreneurship

The feed-in tariffs have alleviated entry barriers for new ventures in the energy sector, as they have removed price risks, volume risks and balancing risks (Brachert, Hornych 2011). The revenue that generators receive in exchange for the power that they produce is not contingent on the market price of electricity and, since utilities are obliged to purchase the power that FiT recipients feed into the grid, there is no risk of not selling the volume of power generated. Moreover, there is no penalty for feed-in tariff recipients to match their production to demand – i.e. if they feed power to the grid at off-peak times or if they do not feed power to the grid at peak demand times, this makes no difference to the revenue they receive, so there is no compulsion to ensure demand-orientated production on the part of feed-in tariff recipients (Brachert, Hornych 2011). For new ventures, absorbing the above risks inherent to operating on the energy market would be difficult and, as such, feed-in tariffs have facilitated entrepreneurialism in the British and German energy sectors.

For financial investors, the feed-in tariffs provide reassurance. Venture capitalists have long been wary of the longer commitment investment and greater complexity associated with environmental entrepreneurship and this has been exacerbated by their lack of understanding of the market for environmental goods and services (O'Rourke 2010, Randjelovic, O'Rourke et al. 2003). Bürer, Wüstenhagen (2009) finds, in a survey of venture capitalists, that feed-in tariffs are the preferred policy instruments for investors, as they offer long-term stability. This contrasts with the low priority that investors gave to climate change as a driver for investment in the renewable energy sector, with climate change lagging behind energy security and competitiveness as motivators (Bürer, Wüstenhagen 2009). This indicates the limited power that climate change has in stimulating venture capital investment in energy and the priority that investors place on a stable market framework, based on instruments like the feed-in tariff. Since the break out of the financial crisis, feed-in tariffs have been undermined by strained public finances (Hofman, Huisman 2012). In this context of increased economic uncertainty and volatility, Hofman, Huisman (2012), repeating the survey of Bürer, Wüstenhagen (2009), find that the certainty associated with the feed-in tariffs remains appealing to investors. In the energy sector, the support mechanisms not only influence entrepreneurial perceptions of market prospects, but also the confidence of investors which determines the ease with which entrepreneurs can finance their energy projects.

2.2.Wider Transition Management

The removal of this protection implies that the niche markets are heading in the direction of surviving autonomously, “driven by its own momentum rather than outside ‘pushes’ or ‘pulls’ in the form of policy” (Jacobsson, Bergek 2004, P.824). It is unclear how well new ventures will withstand this shift towards greater market exposure in Britain and Germany –

(Hart 2011) case of entrepreneurs in the PV sector in New Jersey is interesting in this respect. They outline how, following the partial withdrawal of a "protected institutional space" for PV entrepreneurs in the state, it became harder to finance new PV installations due to the greater unpredictability of earnings from generating PV arising from the reforms. This led to an incumbent power utility filling the vacuum through establishing a solar loan programme and cooperating with smaller firms to expand its PV capacity as a way of learning about the solar PV market in anticipation of tougher environmental regulations to be enforced by the state in the future (Hart 2011). This is a case of an incumbent firm entering the market as a fast-second, aiming to capitalise on its superior mass-market capacities (Markides, Geroski 2005), with new ventures surviving through forming complementary relationships with the utility - i.e. integrating themselves into part of the PV value chain (i.e. installing the PV systems on behalf of the utility). It is possible that, as niche energy markets mature, incumbents engage to a greater extent and new ventures craft a new relationship with these firms to find a viable business model following such change in the institutional context.

The above case study reflects Hockert's and Wüstenhagen's (2010) co-evolutionary model, in which both *Emerging Davids* (new ventures) and *Greening Goliaths* (incumbent firms engaged in incremental environmental innovation) both contribute to the sustainable transformation of industries. Given the innovatory disadvantages which incumbent firms face, such as bounded rationality and the contradiction between radical environmental innovations and conventional, carbon intensive business models (York, Venkataraman 2010) new environmental ventures are the actors with the greater capacity to launch radical environmental innovation. According to Hockert's & Wüstenhagen's (2010) theoretical framework, *Greening Goliaths* initially respond to the innovations of *Emerging Davids* by extending their existing business models to serve environmental niche markets – for example,

energy utilities would offer green electricity tariffs (MacPherson, Lange 2013) targeted at small customer segments. It is as *Emerging Davids* become *High Growth Davids*, gaining in professional and commercial experience and develop into a more formidable market force that *Greening Goliaths*, fearful of retaining their market share, adopt environmental innovations and employ their superior capacities for marketing and cost-reduction to commercialise these innovations on the mass-market (Hockerts, Wüstenhagen 2010). Effectively, *emerging* and, subsequently, *High Growth*, *Davids*, galvanise market incumbents into action on radical environmental innovation. Certainly, according to the theoretical model, both the disruptive force of the entrepreneurial actors and the mass-market capacities of the incumbent actors are necessary to the diffusion of radical environmental innovation. However, the way in which this process evolves remains unclear, in terms of the critical mass that *High Growth Davids* must reach to compel adoption on the part of the incumbents and the extent to which, at the mass-market stage, incumbents follow through with the diffusion of environmental innovation.

Foxon, Reed et al. (2009) argue the existing regime involving a set of practices, processes, technologies and institutions is conducive to incremental innovation, whereas the generation of radical innovations is restricted to *niches*. In other words, they are created at the micro-level and must break through to the meso and macro level (Foxon 2011) by way of a transition pathway which entails the "interaction of technological and social factors at and between different levels, mediated by the actions of actors within an 'action space'" (Foxon 2013), P.10. Foxon (2013) identifies three transition pathways relevant to the energy sector: a market-rules pathway, a central coordination pathway and a thousand flowers pathway. The feed-in tariff mechanisms are rooted in a "thousand flowers" pathway, based on a bottom-up, community led transition comprising citizen energy, with the emergence of

Energy Service Companies working with communities and local authorities to facilitate this decentralized provision (Foxon 2013). The reforms to the support mechanisms will mean that the British and German energy transitions will resemble far more a "central coordination transition pathway" in which the government directs the evolution of the sector by issuing tenders for large-scale generation (Foxon 2013). In Britain and Germany, this is essentially how the transition will proceed from now on – government run tenders for large-scale generation accompanied by substantially reduced feed-in tariffs applying to smaller generation volumes. (Foxon 2013) stresses that each transition pathway carries risks – for instance, the thousand flowers strategy may be beset by decentralised power remaining relatively more expensive and concerns about its reliability. In contrast, he suggests that the centralised coordination strategy marginalises consumers whose willingness-to-pay for ongoing low-carbon investment may fall and that the carbon capture and storage technology upon which base load natural gas and clean coal depend (key technologies in the large-scale, centrally-coordinated scenario) may not turn out to be economically or technically viable. From this analysis, it can be argued that relying on one particular transition pathway may, in fact, entail substantial risk and uncertainty.

The theory presented above indicates that there is interplay between the incumbent actors and the new ventures and that nurturing the *Emerging Davids* is important to the transition

3. Methods

This paper is part of a wider PhD project examining entrepreneurial perceptions of policy in France, Germany and Britain, with a case study approach taken to study the dynamics within the three countries (Yin 2009, Eisenhardt 1989). Three sources of data have been used to construct the case studies, namely: policy documents, interviews with key members of the entrepreneurial team within new ventures and field notes from practitioner conferences. The use of several data sources fulfils the goal of data triangulation (Creswell 2003).

In this paper, empirical data is taken from nineteen extended interviews is included (nine in Germany and ten in the UK). This is supplemented by five shorter interviews, conducted at an energy conference in Germany in 2014. Participants were selected based on their potential to contribute interesting theoretical insights, according to a theoretical sampling technique (Glaser, Strauss 1967), with the sampling strategy being refined as data collection continued (Strauss, Corbin 1990). For example, the dramatic and timely nature of the German reforms informed the decision to conduct additional targeted interviews with German participants. Field notes were gathered at three practitioner conferences in Britain and two in Germany and these enriched the interview data and the information from policy documents.

A process of coding was employed to analyse the interview and field notes data, with first cycle codes being refined into more abstract second cycle codes (Miles, Huberman 1994)from which broader, overarching themes could be identified.

4. British Findings

British respondents had different views regarding the reasons behind the reforms to the support mechanisms for renewable power. The view was expressed that ongoing fallout from the 2008 recession had weakened the government's ability and the public's willingness to finance renewable power; the economy had to gain in strength so that it could tolerate the higher electricity prices necessary to support renewables. Another viewpoint was that the British Government was concerned about the cost of subsidies like the feed-in tariff adversely affecting the country's ability to compete internationally. In the era of globalisation, industries have the flexibility to move to locations with the lowest costs and energy accounts for a large share of that cost. Particularly pertinent contributions came from respondents B1 and B7:

"……if we make our cost base artificially higher than other countries, capital will move." (B1)

"I am sure their focus is that if we've got a strong, healthy economy, we can do it, but, at the moment, we can't. I think their focus is on building a strong economy, so, then, they can implement more of these things" (B7)

This highlights the complex inter-relationships at play in the transition to a different energy sector, discussed in section 2.2. The support mechanism for decentralised power affects a variety of stakeholders indirectly, such as energy-intensive industries, and there are, then, potential indirect consequences, such those industries changing their activities in response to higher energy costs.

As regards the progressive reductions to the feed-in tariffs in Britain, there was complaint about the volatility associated with, especially, the tariff for solar PV – an emblematic quote came from respondent B3:

"…with the degression…it's feast or famine. So, if you're in that side of the business, you need to have other stuff going on" (B3)

The feed-in tariff for solar PV was characterised by generous initial rates with subsequent withdrawal. Such sharp reductions in support has led to an implosion of the market in PV, according to the above respondent, and new ventures operating in this field have had to diversify their activities in order to remain viable. This is one strategy that new ventures could employ in response to the loss of the feed-in tariff mechanism – they could engage in other market sectors, develop different product lines or, in the case of *High Growth Davids*, who have gained experience and benefited from learning opportunities in European markets, expand to new markets, especially in the developing world in which there is a lack of conventional fossil fuel infrastructure combined with rising demand for electricity. Decentralised renewables could be an attractive option for such countries to extend power provision to a wider group of citizens.

Consistent with the arguments in section 2.1, the pernicious effect the reform to the feed-in tariff has on wider confidence in the renewables sector as to the durability of a robust market featured in the interview data:

"…because of the uncertainty over the feed-in tariff, and…investors….a lot of the manufacturers are now questioning whether it's worthwhile putting the R&D into developing a turbine more suited to the UK market, because they're not sure about the longevity of that market… Investors, still at that level, are seeing the government's mixed messages and

saying: 'Why, on earth, would we want to invest in the sector; the government are obviously not supporting it' (B2)

This is consistent with the arguments presented in section 2.1 that, in order to make a long-term commitment to the renewables sector, investors need certainty and confidence in the reliability of government support, as this technology sector remains relatively nascent. According to participant B2, the British Government is in danger of undermining this confidence, and, in so doing, not only restricting the availability of finance for new ventures but also the availability of suitable technology, as manufacturers place less priority on developing technology suitable to the British market. Reforms to the support mechanism not only impact on financial stakeholders but on the wider supply chain and this has major significance for the "entrepreneurial" flavour of British energy policy.

The replacement of the *Renewables Obligation* with the *Contracts-for-Difference* mechanism affected new ventures primarily involved in larger-scale generation of renewable power. Whilst the scheme is relatively new, there was a feeling expressed that the new scheme entailed greater risks for new ventures due to the possibility of being unsuccessful in winning a tender to deliver renewable power:

"Whereas, for contracts for difference, because it depends on the capacity allocation for each technology, you could always have projects operating, but miss out on getting the subsidies and I think that's a really big uncertainty" (B9)

The risk of incurring sunk costs in developing a project and, then, ultimately not being successful in securing a contract to deliver power to the market would be difficult for new ventures to absorb.

This danger of being unsuccessful in obtaining a CfD is exacerbated by uncertainties surrounding the process of distributing subsidies, with respondent B6 remarking:

"…You are not actually guaranteed to get the level of price which the contracts-for-difference purports to guarantee. Understandably it says: 'there is a total pot of money'….and they still haven't agreed the formula by which this would be given out…So, that creates uncertainty…So, nobody is willing to invest. So, the government insists on introducing these things half-baked……We have no idea how much of that will be given to nuclear, wind, on-shore, off-shore" (B6)

Several technologies compete for support, which is capped under the contracts-for-difference scheme, and this, notably, includes nuclear power which has particularly high support costs. It is possible that nuclear power could crowd out support for other renewable technologies leading to a shortfall of contracts available for renewable generators.

Respondent B10 discusses how the reform fundamentally changes the nature of the risk from an investor's perspective:

"I think the bigger impact which we've seen lately….which was introduced also through EMR was the competition element.....because that creates a lot of uncertainty about investment decisions….a lot of people need to work out….do we want to….put money as risk…..whilst we're not even sure if there is a …project at the end of the day…It creates more binary risk which is not great for investors…….and that will drive up the capital cost again… If you make it more a

bidding, competition and auction element, you change the whole risk picture for putting these kind of investments in place". (B10)

Under the *Renewables Obligation*, the risk for new ventures lies in the value of the ROCs (the Renewable Obligations Certificates) which fluctuates according to the performance of utilities in meeting their targets for renewable generation. However, under the CfD mechanism, the risk for an energy project is "binary" – all-or-nothing – contingent on success in the competitive auctions for delivering renewable power. This type of risk is, potentially, harder for investors to manage, as, an unsuccessful outcome has more serious consequences for the investment.

The findings suggest that British entrepreneurs perceive greater uncertainty in their own market from the reforms and also are apprehensive about how these reforms will impact on their ability to raise finance from external investors. Such reforms could pose a credible threat to entrepreneurship in the British energy sector.

5. German Findings

German participants in the study perceived the reforms to the German support mechanisms as adverse to the success of the decentralized citizen energy movement. Certain pertinent remarks included:

"Currently…..the EEG…the way it is going to be determined and implemented…will….certainly slow us down…." (G8)

"The brakes are being totally put on renewables in Germany at the moment….If they had not buried renewables like this…then we would have got there….We will

get there in shorter time if we are just left to get on with it….However, they are putting the brakes on us….” (G3)

“The EEG was very important to me for a long time, because it provided a really good base…I must, however……, because in recent years….a bit from 2009, and in a really big way from 2012…..it has become much less generous…..and now, in 2014, the change is massive…..It is being reversed…..They are forcing renewable energy operators…..to go in a direction that can only be negative.”(G12)

In the above responses, there is an underlying view that the entrepreneurial actors in the renewables sector have not reached a point at which they can withstand such an overhaul to the framework for renewable power in Germany and that this threatens to undermine the continuing progression of the *Energiewende*.

In concert with certain British responses in section 4, respondents G10 and G6 referred to the market consequences of the reforms for the German sector:

“Through the Renewable Energy Law, they have lost an incredible amount of profit…..so this sector has shrunk drastically…..We have firms with which we work…..and the market has collapsed by 50%....an SME tried to keep going….but they had to let people go……These are the consequences of the restructuring of the Renewable Energy Law.” (G10)

“The reforms are not slowing down the branch….they are killing it. Of the four biggest operators in Germany, two are already bankrupt….with the third soon to follow…..” (G6)

The allusion to bankruptcies in the sector is indicative of the way in which the reforms are challenging the existing business models of entrepreneurial actors in the German renewables sector.

Respondent G2 highlights the pernicious effect of market insecurity for new ventures, reiterating this problem of sunk costs and the risk they have taken in entering the market and suddenly finding themselves in a position in which the government has changed the institutional rules of the game:

> *"We dared…..We went into the market…..and we face even more limitations… and the conditions that we had are now being changed. We have entry…..marketing costs…..that through this….preferential treatment….can be borne……now that this treatment is gone…..we cannot afford these marketing costs…..The profit is not so large, that all that is viable……the margin is very small…..the profit per customer is very small…..If the legislators fiddle with that too often….it will become impossible to calculate….too uncertain……and and you keep away from the market….You only do what is very secure…."* (G2)

In the German data, a sentiment emerged that the reforms were driven by large utilities' corporate political activity, with these utilities perhaps concerned about the ramification of the growth of decentralised, entrepreneurial renewable energy generation for their own market share:

> *"The large utilities' lobby has led to this atmosphere against the EEG and this pressure arose to make much more drastic changes to it" (G14)*

Respondents G1 and G8 remarked on the unsuitability of the reformed mechanism for smaller operators that would have difficulty in navigating the complexity inherent within the tender system. Indeed, G8 remarks that the reforms present an opportunity for the utilities to enter the renewables market more seriously.

"RWE, for example, in recent years, they have neglected the issue and, so they are now looking at ways in which they can jump on board with renewables……" (G8)

Utilities like RWE have the resources and manpower to better manage both the transaction costs associated with the tender-based support mechanisms and to withstand the risks of being unsuccessful in the competitive tenders.

As in the British data, there was argument that the reforms would lead to reduced ability to raise finance for new ventures due to the uncertainty of returns resulting from the system:

That's wrong, citizens won't risk money….no bank will finance it…if they do not have security. If they have to spend money first…..and don't know what will come out of it….until half the money has been invested….." (G1)

This is reflective of the findings by Bürer, Wüstenhagen (2009) and Hofman, Huisman (2012)in section 2.1 about the importance of stability in reassuring investors about the security of their capital. In the new framework, the security of capital is far less clear.

Participants criticised the instability of the institutional framework for renewable as much as the reforms themselves. Respondent G2 described how the regular changes to regulations added complexity to the planning process – this was especially acute for certain projects that required greater preparation periods and longer-term investment. There was also concern that

major changes, principally, the shift from feed-in tariffs to direct marketing were being brought in without sufficient time to implement a functioning market. Selling renewable power on the market as opposed to receiving subsidies involves very different rules of the game- there are transaction costs and greater exposure to risks and this may be initially difficult for SMEs to absorb. For sectors in which project development times are longer, such as biomass, this problem is particularly acute, according to interviewee G7, as by the time a project is planned, the rules of the game have changed:

The main problem in Germany at the moment is that the Renewable Energy Law is being reworked at too frequent intervals….to build a windfarm or a PV installation….you need half a year….to plan a biomass plant, you need two to three years….and the Renewable Energy Law is being reformed every three years….and that makes it very difficult to do anything in this field….Once you have finished the planning…the law changes and investors don't invest…because there is no legal foundation" (G7)

For new ventures in Germany, a stable institutional framework appears to be absent. This has serious implications for both the ability of entrepreneurial actors to plan and construct a feasible business model and the willingness of investors to place capital at risk in the sector.

6. Field Notes

The field notes gathered below confirm certain key themes from the interview data in the previous section and offer additional enriching insights:

Note 4: Jenny Hogan, Head of Policy, Scottish Renewables, speaking on panel at lecture "Perspectives on Current and Future Renewable Energy Law", Edinburgh Centre for Carbon Innovation, February 2015	Electricity Market Reform is "changing the landscape of what the future might look like for renewables". There is very little sight of what support might look like beyond 2020 and the big concern of industry is that renewable targets are not binding on member states
Note 6: Podium discussion at Lüneburg Energieforum, Leuphana University, Lüneburg, September 2014	The EEG Reform undermines big successes of the Energiewende. The Energiewende has been bottom-up and there is the danger that the reforms will jeopardise "Citizen Energy".
Note 7: Presentation by Thomas Schomerus at Lüneburg Energieforum, Leuphana University, Lüneburg, September 2014	This (the reforms) will really disadvantage "Citizen Energy". What will the entry requirements to participate in tenders be? This has not been resolved. Those that are unsuccessful in obtaining a contract, will not receive any support. Who can afford that? By and large, the big players. That is the theme here – the big players are back in business.
Note 8: Presentation by Julia Verlinden, Green MP in German Parliament, speaking at Lüneburg Energieforum, Leuphana University, Lüneburg, September 2014	Direct marketing means that revenues are more uncertain and the financing costs for projects rises. The "Citizen Energy" movement will have greater difficulty in future: up to this point, citizens have been responsible for half of the installed renewable energy capacity. Greens propose that there should be no direct marketing for projects generating less than 500KW or 3MW for wind energy projects. Projects under one MW or six MW for wind energy should not be expected to participate in tenders.

The implications of the reforms to support mechanisms featured particularly heavily in the German field notes. As in the interview data, there was substantial criticism in the field notes of the way in which the reforms threatened smaller-scale renewable operators and that this could be particularly problematic for the progression of the Energiewende considering the

major role that decentralised, citizen energy has played in the advancement of renewables up to this point. Agreeing with sentiments in the interview data, Professor Thomas Schomerus warns that the tender system is biased towards the needs of the incumbent utilities. This could mark a turning point in the German Energiewende, shifting from the growth of entrepreneurial energy generation towards a policy more focused on the incumbent utilities and this strategy may carry risks, as proposed by (Gawel, Purkus 2013, Foxon 2013)in section 2.2. In response to this, Julia Verlinden, of the Green Party, recommends that smaller-scale projects are exempt from the obligation to participate in the tenders – this scheme should be reserved for larger-scale generation in order to protect the entrepreneurial actors. This would be a potential compromise situation and a fruitful way forward. In terms of the British context, there is concern relating to the energy market beyond 2020 – in the absence of strong climate targets combined with reduced feed-in tariffs, the market for renewables looks increasingly uncertain.

These field notes reinforce the difficulty that market integration poses for new ventures in the British and German energy sectors. Contingencies are perhaps necessary in order to protect the entrepreneurial streak within the energy transition in both countries.

7. Implications and Conclusions

Returning section 2.2, this paper contends that entrepreneurial actors make a crucial and indispensable contribution to the sustainable transition of the energy sector in Britain and

Germany. That is not to deny that incumbent utilities have a role in disseminating green energy technologies; they are in possession of important resources and commercial capabilities which allows them to convert radical environmental innovation from niche market to mass-market successes (Hockerts, Wüstenhagen 2010). The evolution of British and German energy policy, namely the reforms to the support mechanisms in the two countries, indicate a belief on the part of policy makers that the energy transition is advanced enough for a withdrawal of the protection afforded to niche energy markets (Jacobsson, Bergek 2004) and a policy which is orientated towards incumbents delivering the further expansion of renewables in the next decades.

However, it is argued here that suppressing the entrepreneurial flavour of British and German energy policy, through the reforms to the support mechanisms outlined in this paper, is, in fact, a potentially dangerous strategy. It may be that the disruption that *Emerging* and *High Growth David* firms wreak in the energy market is necessary to motivate the continued engagement of large utilities in the renewables sector and that, once these firms' force dwindles, that the utilities revert to their previous business models or lose the imperative to accelerate the transition to renewable energy activities. It could also be the case that when citizens no longer have access to the same opportunities to make money from citizen energy projects that support for the energy transition will decline and endanger the continued transformation. Rainer Baake, the State Secretary at the Federal Ministry for Economic Affairs and Energy, attributes the high public support for renewable energy in Germany to the substantial engagement of citizens in the energy market, with there being "millions of energy producers in Germany" thanks to the policy support for small-scale decentralised generation.

The risk entailed in the reforms to the renewable support mechanisms in both countries appear to be difficult for new ventures to absorb. Moreover, participating in the energy market under the reformed support mechanisms involves greater transaction costs, as there is a higher level of bureaucracy and this is unsuitable to entrepreneurial actors. To address the concern relating to financial risks, policy makers could design the support mechanisms in such a way that a certain proportion of renewable support is ring fenced for new ventures. This could be particularly important in the British energy market in which renewables are competing alongside nuclear – a technology that could dominate the financing need under the support mechanism framework. In the German context, the obligation to participate in tenders should apply to higher generation volumes – this would protect new ventures somewhat. The current obligation to participate in direct marketing and tenders from the threshold of 100KW appears extreme. These adjustments to the reforms would serve to insulate the entrepreneurial niche markets and retain the innovatory flavour of energy policy - this may be particularly important in view of the current volatility in energy markets.

In a context of reduced support, new ventures in the energy sector are likely to increasingly depend on consumers adopting renewables without strong financial incentives like the feed-in tariff. A possible implication of this is that policy makers must be more creative in stimulating demand for micro-generative technologies. MacPherson, Lange (2013) and Linnanen 2002) lament the slow pace of change in consumer behaviour, noting a disparity between environmental beliefs and actual behaviour, suggesting that financial drivers will remain the most important for the continued adoption of renewable technologies. It is important for the adoption of green innovations to break out of niche markets and for the average consumer to embrace this technology (Belz, Binder 2015). A way of doing this would be to focus to a greater extent on the capital cost of renewable technologies as opposed

to the long-term financing of a feed-in tariff – indeed, part of New Jersey's PV market expansion was attributed to the state government offering a rebate of up to 70% on the capital cost of a PV system (Hart 2011). Tackling the consumer side differently, would, potentially, compensate for the loss of the feed-in tariff and sustain the market for entrepreneurs.

Although Foxon (2013) outlines three core transition pathways that can characterise the transition to a low-carbon energy sector, it is proposed that one pathway does not necessarily need to prevail over another. Elements of the *Thousand Flowers* transition pathway can be combined with elements from the *Central Coordination* pathway – a mixture of the two approaches may be more conducive to the fulfilment of the sustainable transformation of the power sector. Entrepreneurial activity in the renewables sector may, in fact, reinforce environmental innovation on the part of the utilities.

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